High-speed transport options.

When considering the options for high-speed transport on land, it is interesting to look at what has been achieved, rather than just media hype and theories. Here are the current maximum recorded speeds for various type of vehicles:-

430 km/h	1974	Aerotrain, France	Hovercraft on track	Jet propulsion
574 km/h	2007	TGV test train	Steel wheel on rails	Wheel driven electric
581 km/h	2003	SCMaglev, Japan	Maglev suspension	Maglev linear motor
657 km/h	2001	Vesco Car	Rubber tyres on salt	Wheel driven, turbine
701 km/h	2013	Poteet & Main Car	Rubber tyres on salt	Wheel driven, petrol
1,228 km/h	1997	Andy Green Car	Alloy wheels on salt	Jet propulsion

All of the above vehicles are designed for high speed research or record breaking. All are greatly affected by wind resistance, with Andy Green being limited by the sound barrier.

The hover-train Aerotrain is limited by high power consumption for the air cushion, increasing with speed. The power requirements would increase dramatically if operated in a partial vacuum.

Maglev has not yet matched its expectations for high speed, despite its very high capital cost. It has shown little advantage over conventional rail, which is limited by hunting stability of the wheels on the rails, and its high centre of gravity over a narrow track.

Wheels have proved their suitability for very high speeds, despite being very low-tech. They are the most economical solution, both in capital cost and energy consumption.

It is possible that inflatable tyres could be developed for 600 - 900 km/h, this would give considerable savings in the capital cost of the tube. The resilient tyres could absorb the bumps of a tube manufactured from welded steel or cast concrete.

For speeds up to 1,200 km/h, solid wheels seem to be the best option. Andy Green's car is a similar speed, weight and size to the proposed Hyperloop capsule. He is using the same wheel design for his 1,600 km/h attempt. His car is hand-steered and does not suffer from steering instability.

The use of metal rim wheels increases the cost of the tube, as its surface needs to be either machined for high accuracy, or with a cast polyurethane liner. Rotational forces limit the absolute possible speed of wheels to below 1,800 km/h

It seems that high-speed land transport over 1,200 km/h is unlikely in the foreseeable future.

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